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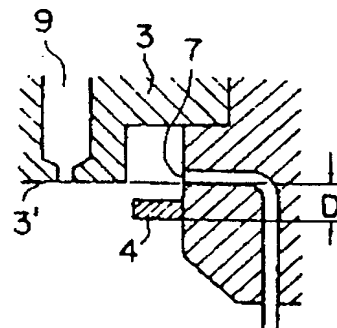
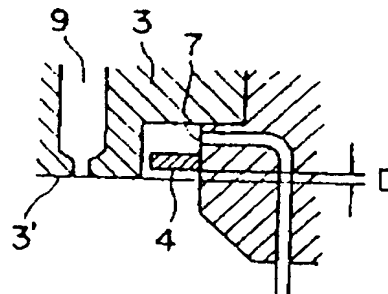
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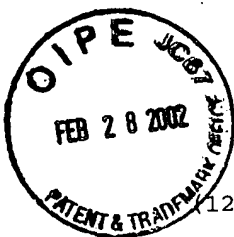
TITLE : DEVICE FOR MELT SPINNING



ABSTRACT : PURPOSE: To obtain the titled device with easy wiping operation, by setting a rectifying plate in such a way that it is adjustable from the same level as that of the end face of the protruded part of a spinneret or a position lower than it to a position higher than the end face of the protruded part, so that spun yarn will not cause fluctuation.

CONSTITUTION: Similar holes are made on the rectifying plate 4 and the protruded part 3', a slit part is formed in a state where the rectifying plate 4 is positioned at the same level as that of the end face of a spinneret or a position lower than it, and an inert gas is made to flow out from the slit part. The distance D is preferably set at 0 during spinning. When D' is >0, denier unevenness is easily induced, but sealing properties with the inert gas is increased. During wiping operation, D is set at 2~5mm and operation is made easy.

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T R A N S L A T I O N

(19) J A P A N E S E P A T E N T O F F I C E (J P)

(12) O f f i c i a l G a z e t t e f o r U n e x a m i n e d P a t e n t s (A)

(11) J a p a n e s e P a t e n t A p p l i c a t i o n P u b l i c a t i o n K o k a i S 6 1 - 1 0 2 4 0 7

(43) P u b l i c a t i o n D a t e : M a y 2 1 , 1 9 8 6

(51) I n t . P a t e n t C l . ⁴	I D N o .	O f c . R e f . N o .	F 1
D 0 1 D 4 / 0 4		6 6 1 3 - 4 L	
5 / 0 8		6 6 1 3 - 4 L	

Request for Examination: N o t Y e t R e q u e s t e d
No. of Inventions: 1
Total of 4 Pages

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(54) [T i t l e o f I n v e n t i o n] : M E L T - S P I N N I N G A P P A R A T U S

(21) A p p l i c a t i o n N u m b e r : S 5 9 - 2 1 8 6 0 8

(22) A p p l i c a t i o n D a t e : O c t o b e r 1 9 , 1 9 8 4

(72) I n v e n t o r s : E . Y a s h i m a
c / o A s a h i K a s e i K o g y o K K
N o b e o k a C i t y

N . I s h i b a s h i
c / o A s a h i K a s e i K o g y o K K
N o b e o k a C i t y

(71) A p p l i c a n t : A s a h i K a s e i K o g y o K K
O s a k a C i t y , O s a k a - f u

S P E C I F I C A T I O N

1. T i t l e o f I n v e n t i o n

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Melt-Spinning Apparatus

2. Claim

A melt-spinning apparatus which comprises
a spinneret having at least one polymer extrusion orifice at
[each of] multiple protrusion portions thereof and
a flow rectifier plate mounted on the spinneret with a fixed gap
around said protrusion portion, in which an inert gas is fed through
said gap, wherein

the edge surface of the protruding portion of said spinneret is
flat and said flow rectifier plate is located at the same level as, or
below the edge surface of the protruding portion, and is mounted
adjustably so as to be locatable above the edge surface of the
protruding portion during wiping.

3. Detailed Description of the Invention

[Field of Industrial Utility]

The present invention relates to a melt-spinning apparatus. It
further relates to a melt-spinning apparatus equipped with a device for
feeding an inert gas so as to suppress the dirtying of the spinneret
surface by low molecular weight materials generated during melt-
spinning.

[Prior Art]

There have been conventional melt-spinning apparatuses which feed
an inert gas towards the vicinity of the spinneret for spinning
(hereafter spinneret), among which there has been a method which is
particularly outstanding in blanketing the spinneret surface with an
inert gas, thereby maximizing the effect of suppressing dirtying by low
molecular weight materials in which the inert gas is fed from the
spinneret surface directly to the spinneret surface and to the vicinity
of the filament being spun, the method calling for a structure as shown
in Figure 4 around the vicinity of said process spinneret. The
apparatus comprises a spinneret with a spinneret protruding portion the
cross-section of which protrudes in a letter "V" shape and with an
extrusion orifice at the apex thereof, and a flow rectifier plate
having holes resembling the spinneret extrusion orifices, whereby an

inert gas is fed through the gaps generated between said spinneret extrusion portion and the flow rectifier plate.

Typical examples are disclosed in Japanese Patent Application Publication S57-15202, Utility Model S59-109776, and Kokai S53-6613.

However, the conventional apparatus is plagued with the following problems:

- (a) Because the extrusion orifice and slit portion are close to each other, the slit [gap] portion tends to become plugged up with polymer during wiping.
- (b) An apparatus in which the extrusion orifice face is not exposed below the edge surface of the flow rectifier plate does not permit a wiping operation in its present configuration.
- (c) If the extrusion orifice surface were "V" shaped or small even if it had a flat surface, it would be difficult to carry out a wiping operation using a jig.
- (d) The inert gas flows in a direction which is at an angle between the oblique side of the spinneret extrusion portion and the vertical line as it makes contact with the filament being spun, which tends to induce a yarn oscillation, thereby resulting in denier non-uniformity.

The prior art has been plagued with such problems and it is essentially impossible to allow a wiping operation after the spinneret surface has been dirtied by low molecular weight materials, which tends to cause the inert gas to disrupt the filament yarn being spun (denier non-uniformity).

[Problem to be Solved by the Invention]

In light of such prior art problems, the present inventors intensively studied a melt-spin apparatus which can substantially reduce production and labor costs, and arrived at the present invention. That is, the present invention provides a melt-spinning apparatus which is distinguished in that the blanketing effect of the spinneret surface by the inert gas is not inferior to that of the conventional method, and in which the progress of dirtying can be substantially delayed, in particular, the wiping operation is made easier, and the process is free from the oscillations of filament yarn being spun.

[Means Used to Solve the Problem]

The present invention is a melt-spinning apparatus which comprises

a spinneret having at least one polymer extrusion orifice at [each of] multiple protrusion portions thereof and

a flow rectifier plate mounted on the spinneret with a fixed gap around said protrusion portion, in which an inert gas is fed through said gap, wherein

the edge surface of the protruding portion of said spinneret is flat and said flow rectifier plate is located at the same level as, or below the edge surface of the protruding portion, and is mounted adjustably so as to be locatable above the edge surface of the protruding portion during wiping.

Hereafter, the present invention is explained with reference to the attached figures.

In Figure 1, 1 is spinning head; 2 a spinning pack. The spinning pack 2 is made up of a spinneret (main body) 3, spinneret protruding portion 3', and flow rectifier plate 4, along with a strainer, filter, metal screen, etc. (not illustrated). Spinneret 3 has multiple protrusion portions 3'; the edge surface of said protruding portion 3' is flat, preferably having an area of at least 20mm² and having at least one polymer extrusion orifice 9 installed therein. The flow rectifier plate 4 has holes drilled in it which resembling protruding portions 3'; and a slit [gap] portion 8 is formed where said flow rectifier plate 4 is mounted at the same level as, or below, the spinneret edge surface. The gap dimension of the portion 8 is preferably in a range of 0.5-1mm; the inert gas flows through the gap portion 8 in a direction parallel to the traveling direction of the filament yarn being spun, thereby completely blanketing the lower surface of the protruding portion 3' and the nearby filament yarn. 5 is a setscrew, which is used to mount the flow rectifier plate 4 to the spinneret 3; adjusting said screw can vary the mounting position of the flow rectifier plate in a direction perpendicular to the spinneret 8 surface. 6 is an inert gas guide tube, which is drilled through the spin pack 2. The inert gas passes through said guide tube 6 and is discharged from the opening 7 into the gap defined by the spinneret 3 and flow rectifier plate 4.

The location of the opening portion is not particularly limited, with no adverse effects as long as it stays within the above gap section. For example, the inert gas guide tube may extend through spinneret 3 so as to discharge [the gas] in to the above gap.

Figure 2a and b are cross-sections illustrating the positional relationship between the spinneret 3 (substantially the protruding portion 3') and the flow rectifier plate; 4 D and D' in a and b, represent respectively, the distance between the edge surface of the spinneret protruding portion 3' and the lower surface of the flow rectifier plate 4.

It is most preferred to set $D=0\text{mm}$ during spinning; if $D>0\text{mm}$, blanketing by the inert gas drops to an unfavorable level.

$D'>0\text{mm}$ is not preferred because the inert gas flow direction is such that the gas comes in contact at an angle, albeit slight, with the filament yarn side, tending to induce denier non-uniformity, although it does improve blanketing thereby advantageously further extending the continuous spinning duration. As the dirtying of the spinneret protrusion section 3' progresses to the extent of requiring a wiping operation, wiping can be effected completely and easily for the lower surface of the spinneret protruding portion by setting $D=2-5\text{mm}$.

Figure 3a and b show the edge surface plan views of protrusion section 3', the arrays of the polymer extrusion orifices 9 for cases where the numbers of polymer extrusion orifices are 3 and 6. The polymer extrusion orifices 9 may be arrayed in a single row or in zigzag fashion along the edge surface of the protruding portion 3' preferably, 1-5mm inward from said edge surface. Having a polymer extrusion orifice 9 close to (less than 1mm) to the edge of the edge surface of the spinneret protruding section 3' is not preferred because this makes it extremely difficult to carry out the wiping operation using a wiping jig; nor is it preferred to have the orifices excessively inward from said edge surface or have a multi-layer array because the inert gas blanketing is made incomplete.

[Examples]

Table 1 shows the results of spinning using a melt-spinning apparatus of this invention from polyhexamethylene adipamide with a relative viscosity of 40 containing 0.3% by weight of a titanium

dioxide delusterant to give 70d-24f filament yarn. The inert gas was steam.

Table 1

Number No.	Position of the Flow Rectifier Plate (Figure 2)	Time Between Wiping Operations	Denier Non-Uniformity
I	D = 5 mm	129 Hr	0.95%
II	D = 0 mm	153 Hr	0.91%
III	D' = 5 mm	164 Hr	1.04%

This example demonstrates that the time required between wiping operations as a result of dirtying of the spinneret surface was extended 10-14 fold compared to a 12hr. duration using no inert gas feeder.

The example also shows that the location of the flow rectifier plate affects the required wiping cycle and denier non-uniformity showing that Run II represents the best stable overall condition.

[Advantageous Effect of the Invention]

The melt spinning apparatus of this invention has its flow rectifier plate variably located in a direction perpendicular to the spinneret edge surface so that the flow rectifier plate is mounted at the same level as, or below, the spinneret protrusion edge surface during spinning, but the flow rectifier plate edge surface can be set during wiping to be above the spinneret protrusion portion edge surface so as to overcome the prior art problems as discussed. Having the protruding portion edge surface flat has facilitated the wiping operation using a jig, which has made it unnecessary to replace the spinneret due to the dirtying of the spinning surface and has substantially shortened the time it takes to carry out the wiping operation. The direction of the inert gas flow fed from the slit section generated between the protruding portion and flow rectifier plate is perpendicular with respect to the spinneret protrusion portion so that it is parallel to the filament yarn being spun, minimizing any induction of yarn oscillation; with regard to the inert gas blanketing, having the polymer extrusion orifices arrayed at edges of the

spinneret protrusion section edge portion edge surface brings each extrusion orifice surface and nearby extruded filament yarn in a direct contact with an inert gas to provide perfect blanketing which is not inferior to that of the prior art, thereby substantially extending the continuous spinning operation time per the spinneret.

4. Brief Description of the Drawings

Figure 1 is a cross-section of the spinneret of a melt-spinning apparatus of this invention.

Figure 2 is a cross-section illustrating the positional relationship between the spinneret protruding portion edge surface and the flow rectifier plate;

Figure 3 is a plan view illustrating an example of arraying polymer extrusion orifices at the spinneret extrusion portion;

Figure 4, the cross-section of the conventional spinneret.

- 1: Spinning head;
- 2: Spinning pack;
- 3: Spinneret (main body);
- 3': Spinneret protruding portion;
- 4: Flow rectifier plate;
- 5: Set screw;
- 6: Inert gas inlet tube;
- 7: Opening;
- 8: Slit portion;
- 9: Polymer extrusion orifice;
- 10: Filament.

Fig. 1

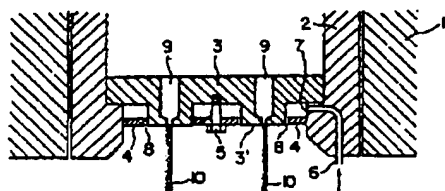


Fig. 2

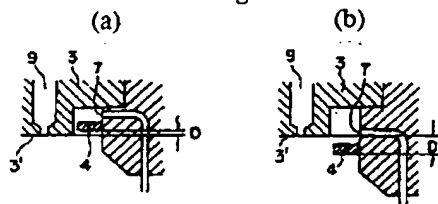


Fig. 3

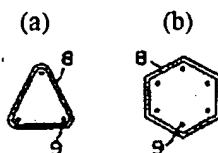
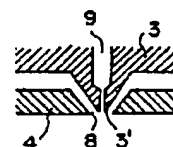


Fig. 4



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